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Aspects of vine weeds and the challenges for their control in the sugar cane fields of Mauritius

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Vine weeds are creeping, climbing and twining plant species that depend on neighbouring plants and objects for their support and development. They have an extensive type of growth, making them fundamentally different from classical weeds which are generally more localised. The sprawling nature of vine weeds together with other biological traits makes their control difficult and ineffective in sugar cane, especially when the crop is tall. Studies on their biology and ecology, based on a holistic approach, are underway in Mauritius to find sustainable solutions for their management through experiments in the fields and in controlled conditions. Research is progressing on four main fronts namely on understanding their (1) ecology and distribution, (2) seed germination and emergence abilities, (3) life cycles and (4) mechanisms of competition. Preliminary results presented here are focused on germination and emergence abilities and their consequences for vine weed control. Twelve major vine species are present in the sugar cane fields. *Basella alba, Ipomoea hederifolia* and *I. grandifolia* are the most aggressive species, the latter being very widespread. Most of the vine plants reproduce through the production of large amounts of fertile seeds having diameter ranging from 2 to 4 mm. This endows them with the capacity to germinate and emerge from depths beyond 6 cm in the soil, and through a mulch of 5 to 10 cm thick, resulting in the ineffectiveness of most pre-emergence herbicide treatment. The germination and emergence of the large-seeded vine weeds are further enhanced by the favourable conditions of the trash cover remaining in the fields after harvest. Though recommended post-emergence tank-mixes are very effective to manage vine weed infestations in young canes, their applications in tall canes is rather difficult, sprayer men getting entangled in the vine development adding to the physical damages to the crop that is already under severe competition. Progress in the work tends to show that management of vine weeds in sugar cane fields would need an integrated approach using innovative techniques and strategies, not depending solely on conventional methods (herbicide application).

Keywords: biology, development, *Ipomoea* spp., pre-emergence, trash cover, post-emergence, management strategies, holistic approach

ASPECTS OF VINE WEEDS AND THE CHALLENGES FOR THEIR CONTROL IN SUGARCANE FIELDS IN MAURITIUS

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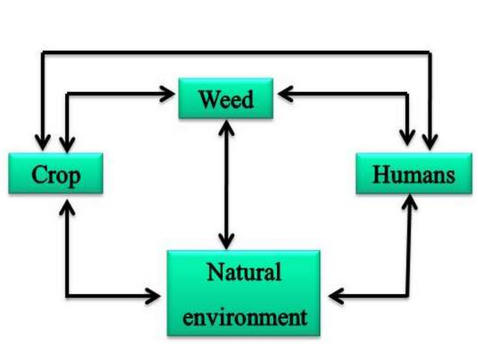
INTRODUCTION

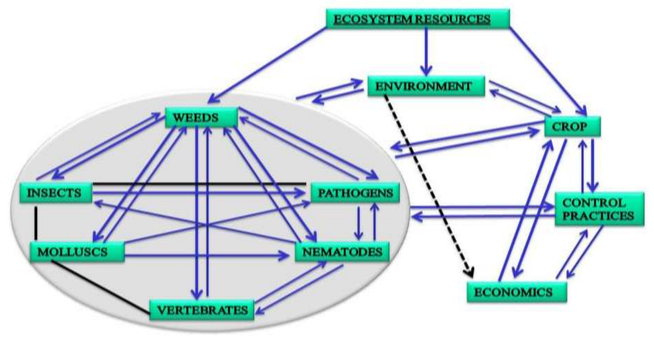
Vine weeds are creeping, climbing and twining plant species that depend on neighbouring plants and objects for their support and development. They have an extensive type of growth, making them fundamentally different from classical weeds which are generally more localised. The sprawling nature of vine weeds together with other biological traits make their control difficult and ineffective in sugar cane, especially when the crop is tall.

OBJECTIVES

To find sustainable solutions for vine weed management in sugarcane crop through studies of their biology and ecology, based on a holistic approach.



'Weed-crop eco-system' (Aldrich, 1984)

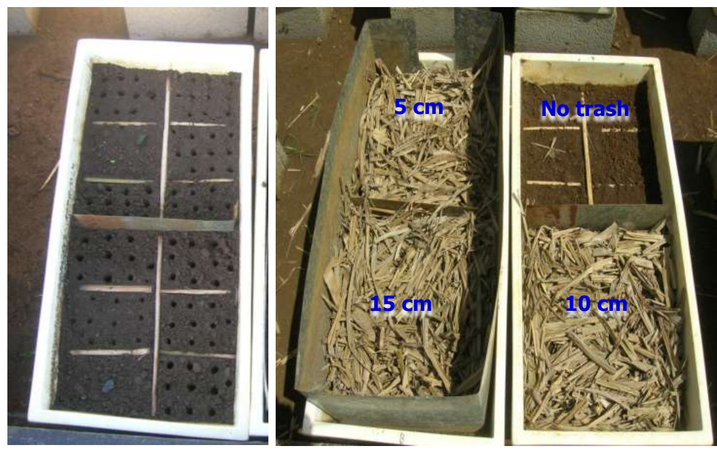


Interaction of weeds and the other components of the agricultural production system (Norris et Kogan, 2000 ; Norris, 2005)

MATERIAL & METHODS

Research is progressing on four main fronts namely on understanding their (1) ecology and distribution, (2) seed germination and emergence abilities, (3) life cycles and (4) mechanisms of competition.

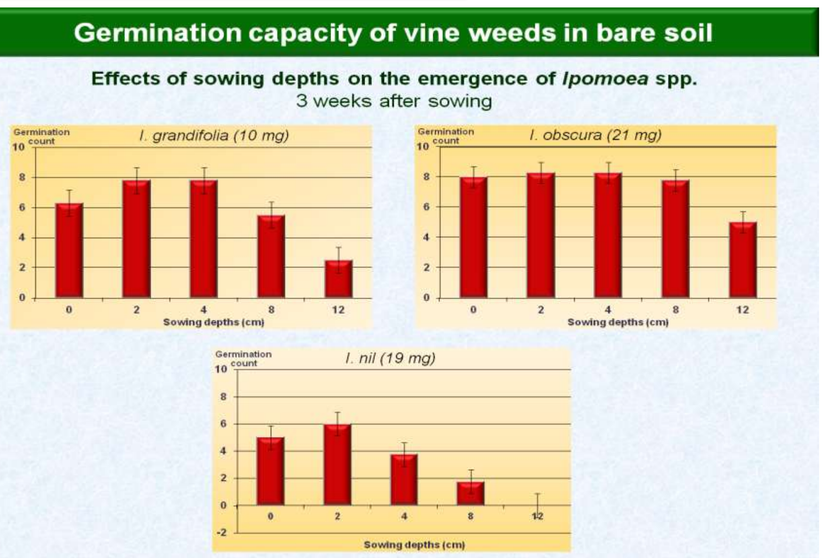
In trials undertaken in fibre glass tanks, *Ipomoea* spp. seeds were sown at depths ranging from 0 (placed at the surface) to 12 cm in the soil. In other trials, the seeds sown were also covered with 5, 10 and 15 cm of trash mulch compared to an uncovered control. Germination counts and measurements of hypocotyle lengths were recorded.



RESULTS AND DISCUSSION

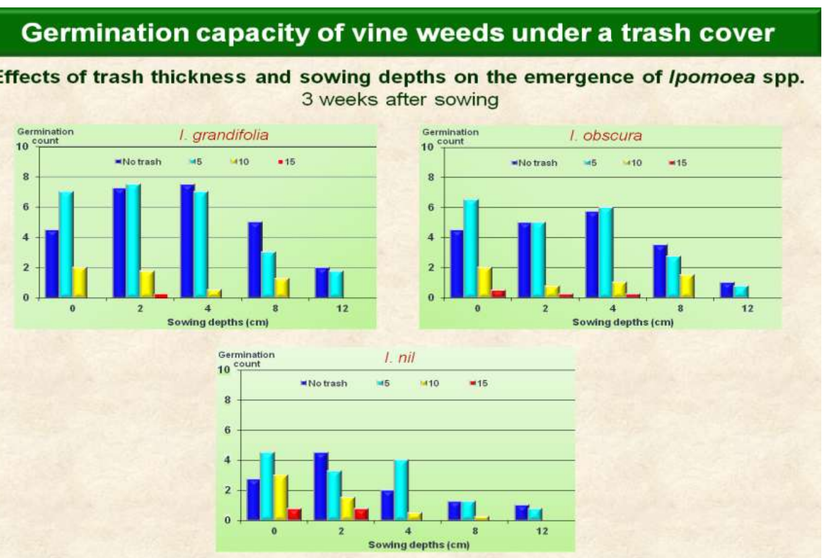
Germination capacity of vine weeds in bare soil

Effects of sowing depths on the emergence of *Ipomoea* spp.
3 weeks after sowing

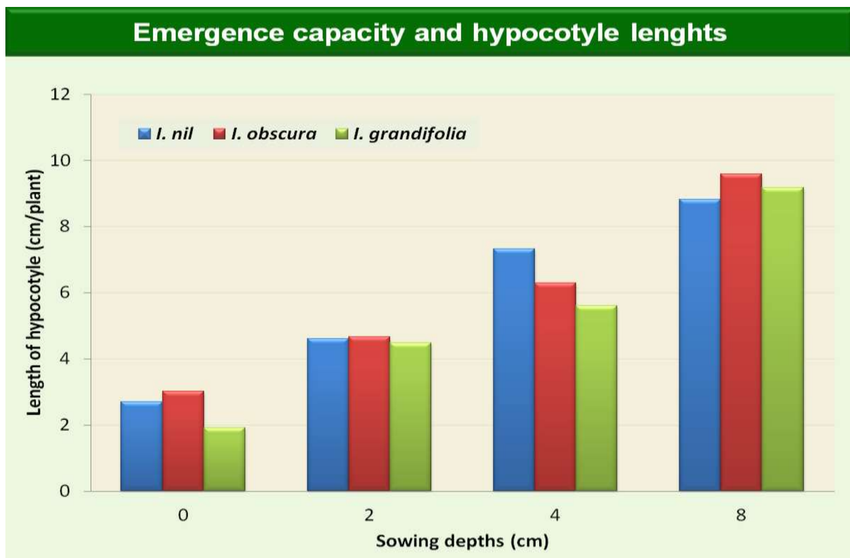


Germination capacity of vine weeds under a trash cover

Effects of trash thickness and sowing depths on the emergence of *Ipomoea* spp.
3 weeks after sowing



Emergence capacity and hypocotyle lenghts



Field observations and weed surveys showed that twelve major vine species were present in the sugarcane fields. The most aggressive species were *Basella alba* L., *Ipomoea hederifolia* L. and *I. grandifolia* (Dammer) O'Donell, the latter being very widespread. The trials demonstrated the vine weeds had the capacity to germinate and emerge from depths beyond 6 cm in the soil and through a mulch of 5 to 10 cm thickness. This was attributed to the large diameter of the seeds (2-4 mm) and their ability to produce longer hypocotyles when found at deeper soil depths. These results could explain the ineffectiveness of most pre-emergence herbicide treatments to suppress vine weed germination and emergence in the fields. The trash mulch produced after mechanical green cane harvesting created even more favourable conditions for vine weed development.

CONCLUSIONS

Research work tends to show that management of vine weeds in sugar cane fields in Mauritius would need an integrated approach using innovative techniques and strategies, not depending solely on conventional methods, particularly herbicide application.

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